

**Amendments to the Claims:**

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A numerical processing apparatus for deciding correspondence from output points in an output space of  $m$  dimensions to input points in an input space of  $n$  dimensions wherein  $m$  is smaller than  $n$ , the numerical processing apparatus comprising:

a limited output point group generation unit that generates limited output points in the output space respectively corresponding to limited input points satisfying a predetermined constraint condition that is set in the input space in advance, to generate a plurality of limited pairs each consisting of a limited input point and a corresponding limited output point; and

an input point element determination unit that generates an inverse mapping function from the output space onto the input space based on the plurality of limited pairs and determines at least one element of the input point satisfying the constraint condition, when an output point is given, ~~on the basis of the plurality of limited pairs using the inverse mapping function.~~

2. (Original) The numerical processing apparatus according to claim 1, wherein the constraint condition includes a condition in which the correspondence from output points to input points is decided uniquely.

3. (Original) The numerical processing apparatus according to claim 1, wherein the input point element determination unit determines at least one of  $n$  elements of the input points on the basis of the limited output point group and a group of elements to be determined in the limited input point group corresponding to the limited output point group.

4. (Original) The numerical processing apparatus according to claim 1, further comprising:

an input point determination unit that determines the residual elements of the input points on the basis of the given output point and at least one element of the input points determined by the input point element determination unit.

5. (Currently Amended) A color processing apparatus for deciding correspondence from output colors in an output color space of  $m$  dimensions to input colors in an input color space of  $n$  dimensions wherein  $m$  is smaller than  $n$ , the color processing apparatus comprising:

a limited output color group generation unit that generates limited output color ~~points~~colors in the output color space respectively corresponding to limited input color ~~points~~colors satisfying a predetermined constraint condition that is set in the input color space in advance, to generate a plurality of limited pairs each consisting of a limited input color ~~point~~ and a corresponding limited output color ~~point~~; and

an input color element determination unit that generates an inverse mapping function from the output color space onto the input color space based on the plurality of limited pairs and determines at least one element of the input color satisfying the constraint condition, when an output color is given, ~~on the basis the limited input color group and the generated limited output color group using the inverse mapping function.~~

6. (Original) The color processing apparatus according to claim 5, wherein:  
the input color space includes an element of black; and  
the constraint condition includes a condition of the input colors in which the output colors corresponding to the input colors are distributed on a curved surface corresponding to a value of black, which is the element of the input colors.

7. (Original) The color processing apparatus according to claim 5, wherein:

the input color space includes four elements of cyan, magenta, yellow and black; and

the constraint condition includes a condition that a sum of cyan, magenta, yellow and black takes a value decided in advance.

8. (Original) The color processing apparatus according to claim 5, wherein:  
the input color space includes four elements of cyan, magenta, yellow and black; and

the constraint condition includes a condition that at least one of cyan, magenta and yellow takes a maximum value in an allowable range.

9. (Original) The color processing apparatus according to claim 5, wherein:  
the input color space includes four elements of cyan, magenta, yellow and black; and

the constraint condition includes a condition that at least one of cyan, magenta and yellow takes a minimum value in an allowable range.

10. (Original) The color processing apparatus according to claim 5, wherein:  
the input color space includes four elements of cyan, magenta, yellow and black,

the color processing apparatus further comprising:

an input color determination unit that determines the residual elements of the input colors on the basis of the output color and at least one of the elements of cyan, magenta, yellow and black of the input color determined by the input color element determination unit.

11. (Currently Amended) A numerical processing method for deciding correspondence from output points in an output space of  $m$  dimensions to input points in an input space of  $n$  dimensions, wherein  $m$  is smaller than  $n$ , the numerical processing method comprising:

generating limited output points in the output space respectively corresponding to limited input points satisfying a predetermined constraint condition that is set in the input space in advance, to generate a plurality of limited pairs each consisting of a limited input point and a corresponding limited output point; ~~and~~

generating an inverse mapping function from the output space onto the input space based on the plurality of limited pairs; and

determining at least one element of the input point satisfying the constraint condition, when an output point is given, ~~on the basis of the plurality of limited pairs using~~ the inverse mapping function.

12. (Currently Amended) A color processing method for deciding correspondence from output colors in an output color space of  $m$  dimensions to input colors in an input color space of  $n$  dimensions, wherein  $m$  is smaller than  $n$ , the color processing method comprising:

generating limited output ~~color points~~colors in the output color space respectively corresponding to limited input ~~color points~~colors satisfying a predetermined constraint condition that is set in the input color space in advance, to generate a plurality of limited pairs each consisting of a limited input color ~~point~~ and a corresponding limited output color ~~point~~; ~~and;~~

generating an inverse mapping function from the output color space onto the input color space based on the plurality of limited pairs; and

determining at least one element of the input color satisfying the constraint condition, when an output color is given, ~~on the basis of the plurality of limited pairs using~~ the inverse mapping function.

13. (Currently Amended) A computer readable storage medium storing a color processing program that when executed, causes a computer to execute a numerical processing for deciding correspondence from output points in an output space of  $m$  dimensions to input

points in an input space of  $n$  dimensions, wherein  $m$  is smaller than  $n$ , the numerical processing program comprising:

~~generating a limited~~limited ~~output point group~~points in the output space respectively corresponding to ~~a limited~~limited ~~input point group~~points satisfying a predetermined constraint condition that is set in the input space in ~~advance~~; ~~and~~advance, to generate a plurality of limited pairs each consisting of a limited input point and a corresponding limited output point;

generating an inverse mapping function from the output space onto the input space based on the plurality of limited pairs; and

determining at least one element of the input point satisfying the constraint condition, when an output point is given, ~~on the basis of the limited input point group and the generated limited output point group~~using the inverse mapping function.

14. (Currently Amended) A computer readable storage medium storing a color processing program that when executed, causes a computer to execute a color processing for deciding correspondence from output colors in an output color space of  $m$  dimensions to input colors in an input color space of  $n$  dimensions, wherein  $m$  is smaller than  $n$ , the color processing program comprising:.

~~generating a limited~~limited ~~output color group~~colors in the output color space respectively corresponding to ~~a limited~~limited ~~input color group~~colors satisfying a predetermined constraint condition that is set in the input color space in ~~advance~~; ~~and~~advance, to generate a plurality of limited pairs each consisting of a limited input color and a corresponding limited output color;

generating an inverse mapping function from the output color space onto the input color space based on the plurality of limited pairs; and

determining at least one element of the input color satisfying the constraint condition, when an output color is given, ~~on the basis of the limited input color group and the generated limited output color group~~; using the inverse mapping function.